

# Photoproduction of top quarks in peripheral heavy ion collisions

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## Abstract

In relativistic heavy ion collisions, top quarks can be produced by photon-gluon fusion when a photon from the Weizsäcker-Williams virtual photon field of one nucleus interacts with a gluon in the other nucleus. Photoproduction with heavy ions at the Large Hadron Collider (LHC) will be the first accessible non-hadronic top production channel. We calculate the  $t\bar{t}$  photoproduction cross sections, pair mass and top quark rapidity distributions in peripheral heavy ion collisions. The cross sections are sensitive to the top quark charge and the large- $Q^2$  gluon distribution in the nucleus. We find a cross section of 94 pb in calcium-calcium collisions, leading to 190 pairs in a one month ( $10^6$  sec) LHC run. We also find  $p\text{Pb}$  and  $p\text{Ca}$  cross sections of 5.8 and 3.4 pb respectively, resulting in 6 and 34  $t\bar{t}$  pairs per month.

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